

RENEWABLE ENERGY AND PARTICIPATION OF WOMEN: A REVIEW

**Dr. Indra Jakhar*

**Assistant Professor in Economics, C.M.G. Govt. College for Women, Bhodiakhera, Fatehabad*

Abstract

We all understand that globalization and market liberalization has underpinned the development, but the crucial role played by energy cannot be ignored. Over the time the energy use is increasing but the sources of energy are not ample enough to fuel the growth, therefore renewable energy is the only viable option to make the growth sustainable. As women are the primary consumers and beneficiaries their active participation and involvement plays an important role in making shift to renewable sources of energy more successful. Against this background the paper reviews some studies which highlight the importance of gender equality in energy sector and upliftment of women especially in rural areas with increased participation and income generation avenues in areas of renewable energy.

Key terms: energy, renewable, rural, women.

Email: indrajakhar105@gmail.com

Introduction: Energy is the lifeblood of the present day global economy – a crucial input to nearly all of the goods and services of the modern world. As Peter Voser (2011) explains Energy: The Oxygen of the Economy, “Without heat, light and power you cannot build or run the factories and cities that provide goods, jobs and homes, nor enjoy the amenities that make life more comfortable and enjoyable.” As a result of the economic progress of the past decades we have seen a major transformation in the standard of living of hundreds of millions of people and the most noteworthy improvements in material well being have been in the emerging economies of the world. The table below reflects the consumption of energy and projection for the coming years in different regions.

Region	Consumption (million tons of oil equivalent)									
	1990	1995	2000	2005	2010	2016	2020	2025	2030	2035
United States	1966	2119	2310	2349	2284	2273	2334	2344	2341	2325
Brazil	126	158	188	211	268	298	330	378	419	451
EU	1672	1661	1732	1819	1754	1642	1667	1623	1570	1513
Russia	865	662	620	647	673	674	711	720	723	722
Middle East	264	351	423	565	734	895	980	1085	1189	1287
Africa	222	244	274	327	389	440	509	603	710	840
China	683	889	1008	1800	2491	3053	3387	3753	4017	4207
India	195	251	316	394	537	724	880	1118	1365	1624

Source: Renewable energy for sustainable development in India: current status, future prospects, challenges, employment, and investment opportunities

The linkages between energy, other inputs and economic activity changes as the level of development changes. In the initial stages of development cow-dung, twigs and wood are pre-dominant sources of energy, as the nation advances there is shift towards more processed form of fuels like bio fuels and charcoal and in the advanced stages of development electricity and fossil fuels occupy the place (Toman & Jemelkova, 2003). But now the characteristics of modern global economy are distinct than the past, as today the major changes are:

- Increasing age of population in developed countries, so they shift more to techno advance products which leads to more increase in energy demand.
- The developing countries in their race to development are emerging fast in the global scenario, which leads to increase in their labour participation, more investment; more productivity in developing countries all these further needs more energy.
- Another change observed is the increase in urbanization in the developing countries which further accelerates the demand for energy.

If we look around us every step of progress has come with an additional demand for energy-cars, ships and aircraft to move, hospitals to give quality health care, production of more and better goods, irrigation for better farming. In fact every element of our lives is increasingly going to become energy intensive-that is a necessary prerequisite for development (Food and Agricultural Organization, 2000). Achieving the goals of poverty reduction, improved living standard and increased economic output imply increasing energy. So energy is one of the crucial input for sustaining the growth. As the fossil fuels are declining so the viable option is renewable energy.

Renewable Energy: Energy use both in total and per capita terms has been continuously increasing in the industrialized countries. Makhijani and Litchenberg (1972) reported that industries with identical living standards (the United Kingdom, Australia, West Germany, Denmark, Norway, France, Belgium and New Zealand) exhibited major variation in energy consumption. More than the level of production, the structure of economy and intensity of energy use determine the energy demand. With the booming economic growth, Asia will play an increasingly important role in global economic and energy matters. World primary energy consumption is projected to expand at an average annual growth rate of 2.1 percent by 2020. About 70 per cent of the increase would be accounted for by non- OECD member economies, two-thirds of which are from the Asian region. Ensuring energy security would therefore turn out to be a vital task. Thus a safe, secure and affordable supply of energy is pre-requisite for a nation to enjoy the fruits of development. But this is not possible with the non-renewable sources of energy as later or sooner they will extinguish and the long term sustainable solution is renewable sources of energy. A vast amount of literature exists on the shift towards the renewable sources and need to develop renewable energy technologies. (Pandey,2006).highlights that the issues regarding demand and supply of energy and management of energy resources were not in focus and no policy framework was developed. It was the oil embargo in 1973 that compelled the countries (both the developed and developing) to think over the problem of energy security. A vast amount of research was conducted to think for the possible solutions to overcome the crisis and modeling exercise was done to meet the demand and supply gap. Some of the notable studies reviewed in this context are as follows:

Rangarao(1974) highlights the energy crisis being faced by the world with special focus to the developing countries and emphasizes on need for other alternatives than fossil fuels. There is need to design such technology that can make best use of the renewable resources as they are available in plenty in developing countries. B N (1979) draws attention towards the faulty planning and management of energy system in India which have aggravated the energy crisis, the development planning should be pursued in such a way that the growth rate of energy sector must be a step ahead of the overall rate of growth of the national economy. Pendse (1980) state that the energy crisis had long been there but it has been recognized later and its effect have been traumatic for all the sectors of economy, especially for the developing countries like India. In this study two solutions are presented for developing countries to overcome the crisis i.e. the hard path and the soft path. The former is to continue with the fossil fuels and make earnest efforts to meet their growing demand for energy and the later is to shift from non-renewable resources to renewable resources and conserve the fossil fuels. Ghosh (1991) focuses on the various challenges and the opportunities of overall energy scenario. After the first ‘oil shock’ of November 1973, most of the developed countries have succeeded in significantly reducing the elasticity of energy demand to GDP growth. Unfortunately this elasticity of energy demand to GDP is quite high in India. The author says that there is need to shift to renewable energy sources and conserve the non-renewable sources to promote the growth of economy on sustainable basis. The figure1 below shows the share of renewable energy in total electricity consumption.

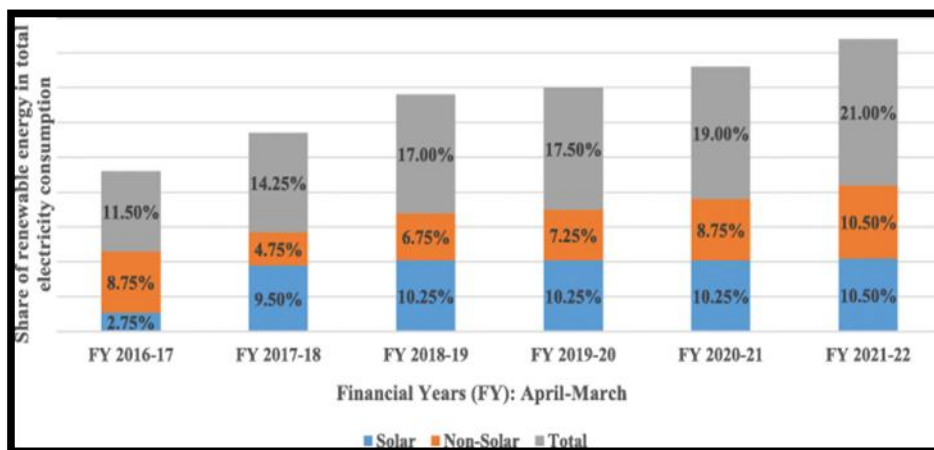


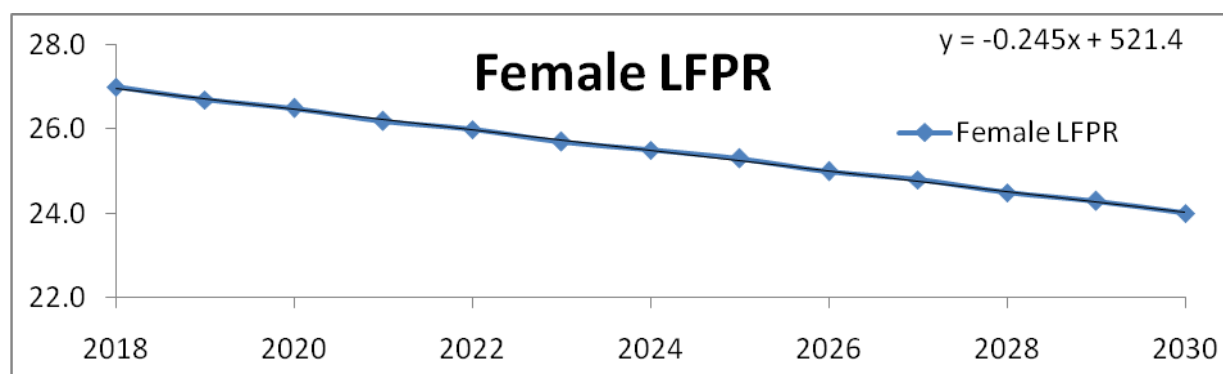
Figure1

India is aiming to attain 175 GW of renewable energy which would consist of 100 GW from solar energy, 10 GW from bio-power, 60 GW from wind power, and 5 GW from small hydropower plants by the year 2022 (J .Rajesh Kumar&Majid,2020).Over the recent years India is making a progress over switching to cleaner and safer energy but the renewable energy sector is lacking in inadequacy of data for relationship of employment in renewable energy sector and poverty reducing and secondly lacks in incorporating women. As women are the primary consumers and beneficiaries their active participation and involvement plays an important role in making a shift to renewable sources of energy and renewable energy technologies. So the paper focuses on the gender perspective of renewable energy. No doubt the Government is undertaking several initiatives and have introduced on a mass scale various renewable energy technologies and programs, but due to lack of active participation of women there raises a question on sustainability of such programs.

Also the active participation of women would not only promote the use of renewable energy but also raises the avenues of income generation for the women.

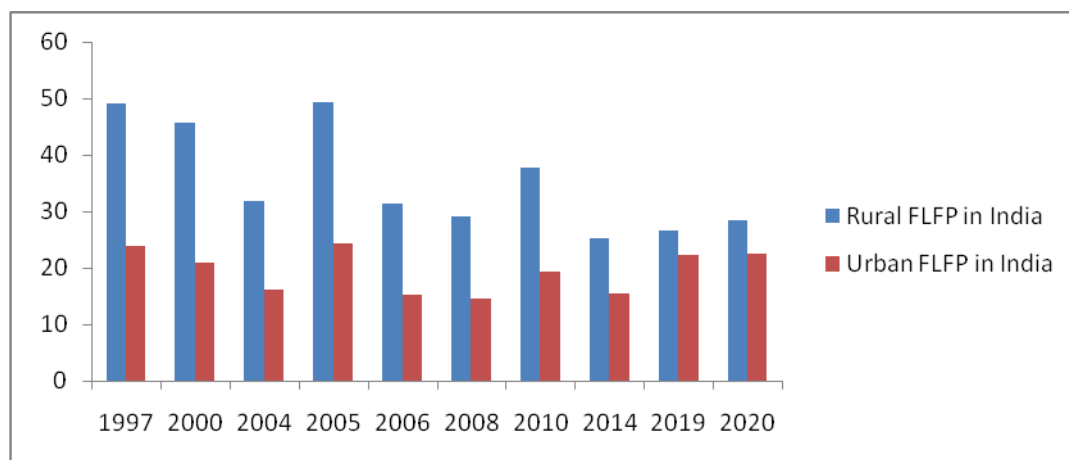
Role of women in renewable energy: India has achieved a substantial growth rate in recent decades. All demographic and economic conditions are improving for women. The average GDP growth rate has been 6-7 percent in last two and half decades. Fertility rate has fallen, women education improved substantially. Presently most disturbing trend in India is stagnant, rather declining female labour force participation rate. This must be great concern for Indian policy makers as women comprise half of country's population. But trends of labour force participation are declining presently and projection till 2030 also confirm further decline.

Figure: 2 Projection of Labour Force Participation: 2018-2030



Source: Authors own analysis based on ILO data

Figure: 3 Female Labour force Participation in India



Source: Self computed NSSO Data

As clear from the above figure 3 that the female labour force participation is declining over time and after 2010 the decline is more in rural female labour force. As the income rises we move up in energy ladder i.e. as income rises we start using the clean and secure sources of energy. As compared to the urban areas rural areas still face the problem of frequent breakdown of the electricity, illegal usage and thefts which lowers the opportunities of upliftment of the rural areas. So involvement of women as a key role in framing, designing, and application of renewable energy technologies especially in rural areas will not only lead to better appliances as women are direct users of energy in household chores but also save their time and effort that can be utilized in helping other villagers in making them techno friendly and benefits of clean fuel for the health. Participation of women will also raise the income of women that will empower them economically to use the monetary benefits in using the appliances that are safer and cleaner also make the life of women to manage the work life balance. In rural areas the key issue of still heavy dependence on fuels, firewood, twigs than the cleaner and safer fuels apart from the availability of L.P.G is the income and the prices of energy services. Women involvement will supplement the additional income required for the fuel. Also at some places the renewable energy is not successful because lack of proper guidance and technical expert, if women are trained accordingly and it will help in making the renewable energy programs more successful. There is need to in calculate the gender perspective in different renewable energy programs. Literature reviewed suggests that with the inclusion of women in renewable energy programs there are twin benefits of

providing successfully sustainable energy and empowering women towards gender equity which will help in reducing poverty.

Balakrishnan Lalita(2000). Focuses on how developing countries need to switch to the renewable sources of energy for meeting the ever increasing demand and to combat the climate change. To improve the status of women they need to be economically independent and their participation need to be increased. For this the participation of women and involvement in various energy programs is needed as it will help solving the problems of household drudgery health hazards which will help in saving their time and energy and contributing more to productive activities.

Krishnamurthy Saravan.et.al (2017) the study is conducted in the rural regions of Maharashtra where self help group and NGO has been active to access the viability of renewable energy technologies. In most of research conducted in rural areas it was found that the rural families are most probably headed by the rural females as the men moves to cities in the search of the job. As such availability of microfinance loans and their participation helps in improving the life of women in terms of better health, education and in calculating the saving habits. By applying the exploratory factor analysis and surveying the 10 villages of Maharashtra the study concludes that the development of rural areas stand still because of lack of continuous and smooth electrification. The Government has initiated time and again in introducing several projects of renewable energy technologies for the upliftment and clean and secure supply of energy in rural areas, but they stand still and do not show desired results .One of the major reason of lack of sustainability of such projects is women not involved in such projects.

ENERGIA(2018) report of policy briefs on sustainable energy). Focuses that the involvement of women in energy value chains as employees and as entrepreneur helps in increasing their incomes. Also women invest large share of their income education of children and the upliftment of the family.

Cecelski Elizabeth(2000) the study explores how a decentralized renewable energy technologies can benefit from increasing women participation in such programs. As women are the mainstream users and producers of the household energy so failing to take women as active players in research and analysis of energy will lead to large part of energy production and consumption unexplored.

ESMAP(2004)study is conducted in six states of INDIA comprising 180 villages and more than 5000 households to assess the energy sources in rural areas .Study concludes that there exists wide differences in access to improved forms of energy. Also the access to improved forms of energy improves and benefits the life of rural women in tremendous manner.

Energia (2019) the research is conducted in more than 12 countries and found that the energy policies and programmes that do not target women as beneficiary and participatory resulted in inequitable access to energy. In order to take in order to realize full potential of energy programmes, women need to be involved and supported in the form of capacity building in technology, business skills and leadership; marketing, promotion and distribution; access to finance; and one-to-one mentoring.

The Way Forward: In order to make the growth more sustainable and inclusive there is need to increase the involvement of women in renewable energy technologies. It will help in solving the twin problems of clean fuel and increase in female labour force participation. As the above studies conducted highlights the benefits of increasing participation of women in renewable energy sector will make it more sustainable. So the paper makes an attempt to understand the relation in energy security and women participation through the existing literature. It will help the policy makers in renewable energy sectors to understand the role of women and also help in further empirical research to understand the two way relation of women and energy. According to the World Bank, more than 270 million Indians live in poverty. The government has committed to installing 175 GW of Renewable Energy by 2022. Most of the projects are installed in rural areas, so the civil society, training institutes ,clean energy enterprises and the government should all work one in one to create good quality employment and inclusion of women. Such an initiative could improve the lives of women and their families.

References

1. Makhijani and Lichtenberg, (1972). Energy and Wellbeing. *Environment*14, 10-18.
2. Rangorao, B.V. (1974). Alternatives in Energy Development. *Economic and Political Weekly*, 9 (27), 1063-69.
3. B.M.(1979).Behind the Energy Crisis. *Economic and Political Weekly*, 14(45), 1828-29.
4. Pendse, D.R. (1980). Energy Crisis and its Impact on consumers in Third World: II. *Economic and Political Weekly*, 15(4), 175-184.
5. Ghosh, A.(1991). Eighth Plan: Challenges and Opportunities-V: Energy: Overall Scenario, Rural Energy, Renewable Sources and Oil and Natural Gas. *Economic and Political Weekly*, 26 (7), 331-337.
6. Cecelski, E (2000) Energy, Environment & Development Germany. NREL/SR-550-26889.
7. Balakrishnan ,L.(2000). Renewable energy as income generation for women. *Renewable Energy* 19, 319±324.
8. Reddy B. S, & Balachandra (2002).A Sustainable Energy Strategy for India Revisited .*Economic and Political Weekly*, Vol. 37, No. 52 (Dec. 28, 2002 - Jan. 3, 2003), pp. 5264- 5273.

9. Ito, Kokichi., Zhidong & Komiya. Asian Energy Outlook up to 2020. *Economic and Political Weekly*, September, 2005.
10. Pandey, R. (2006). How Can India Achieve Energy Security. *Economic and Political Weekly*. January 28.
11. Peter V (2011) 'Energy: The Oxygen of the Economy', Chief Executive Officer, Royal Dutch Shell, the Netherlands; Energy Community Leader 2011, *World Economic Forum*
12. Food and Agricultural Organization of United Nations. (2000). Environment and Natural resource. *Working paper no.4*, Natural Resources Management and Environment Department
13. Mahat, I (May 2011). Gender, energy, and empowerment: a case study of the Rural Energy Development Program in Nepal. *Development in Practice*, May 2011, Vol. 21, No. 3 (pp. 405-420).
14. Krishnamurthy S, Joseph, Pradhan and Rao (2017). Empowering Women of Rural India for Renewable Energy Adoption – An Exploratory Factor Analysis. *Indian Journal of Science and Technology*, Vol. 10(38).
15. The Hindu, May 2018, India's transition to clean energy could improve the quality of life of women.
16. Gender in the transition to sustainable energy for all (2019): From evidence to inclusive policies Synthesis report of the evidence generated by the ENERGIA Gender and Energy Research Programme ENERGIA International Network on Gender and Sustainable Energy.
17. International Renewable Energy Agency IRENA (2019) Renewable Energy: A Gender Perspective.
18. Choudhuri P, & Desai a Sonalde (2020) Gender inequalities and household fuel choice in India. *Journal of Cleaner Production* 265 (2020) 121487.
19. Charles R., J & M. A. Majid (2020) Renewable energy for sustainable development in India: current status, future prospects, challenges, employment, and investment opportunities *Energy, Sustainability and Society* volume 10, Article number: 2 (2020)